MAINTENANCE MANUAL

STERIS AL-1000 Chemistry Delivery System

(12/18/09) **P764333-823**

STERIS AL-1000 Installation-Operation-Service Manual

SAFETY SYMBOLS

Familiarize yourself with the meaning of each Safety symbol appearing either on the unit or in the instruction manual.

GENERAL CAUTION: Indicates a general safety caution.

SHOCK HAZARD: Indicates that hazardous voltages inside the enclosure.

READ MANUAL: Indicates to read the manual for important instructions and procedures related to safety.

CAUTION: Wear protective clothing and eyewear when dispensing chemicals or other materials. Observe safety handling instructions (MSDS) of chemical mfrs.

CAUTION: To avoid severe or fatal shock, always disconnect main power when servicing the unit.

CAUTION: When installing any equipment, ensure that all national and local safety, electrical, and plumbing codes are met.

Specifications

Parameters	Default Settings	Range
Pump Flow Rates	30 ml/ min.	30 ml or 120 ml / minute
System Modes	Relay Mode (STERIS Washers)	Signal Mode (HAMO and others)
Cycle Count Pump	Pump 2 (Detergent)	Pumps 1, 2 , 3 or 4
Units of Measure	Metric	Standard (U.S.)
Variable Speed Settings	30 ml (10%) / 120 ml (25%)	0-100% (40 RPM Max)
Formula Volumes (Signal Mode) for Non-STERIS Washers	0-999 ml	0-999 ml or 0-99.9 ounces
Formula Delay Times (Signal Mode) for Non-STERIS Washers	___	0-99 seconds
Pass Code	0000	0000-9999
Signal Qualifying Time	3 Seconds	0-9 Seconds

Programming Notes:

- The cycle counter has its own menu to allow resetting back to zero
- Pass code does not change when clearing all programmed settings
- To terminate any operation or to exit the programming menus during programming press and hold the enter key.
- Contact STERIS Technical Support for a temporary AL-1000 pass code should pass code be misplaced or forgotten. You will need to press and hold the Scroll key to get a three digit number that STERIS Tech support will need to generate a new pass code for you.

General Theory of Operation

The AL-1000 is a high precision electronic dosing system designed exclusively for STERIS Prolystica Ultra Concentrated Chemistries. The system will interface and dose chemistries on all STERIS equipment and competitive washer sterilizers.

A unique microprocessor pump controller interfaces to the washer's chemical pump power outputs and low supply sensors via a customized washer interface module that mounts inside the washer. Service friendly electrical connectors make washer interfacing simple and easy for the technician.

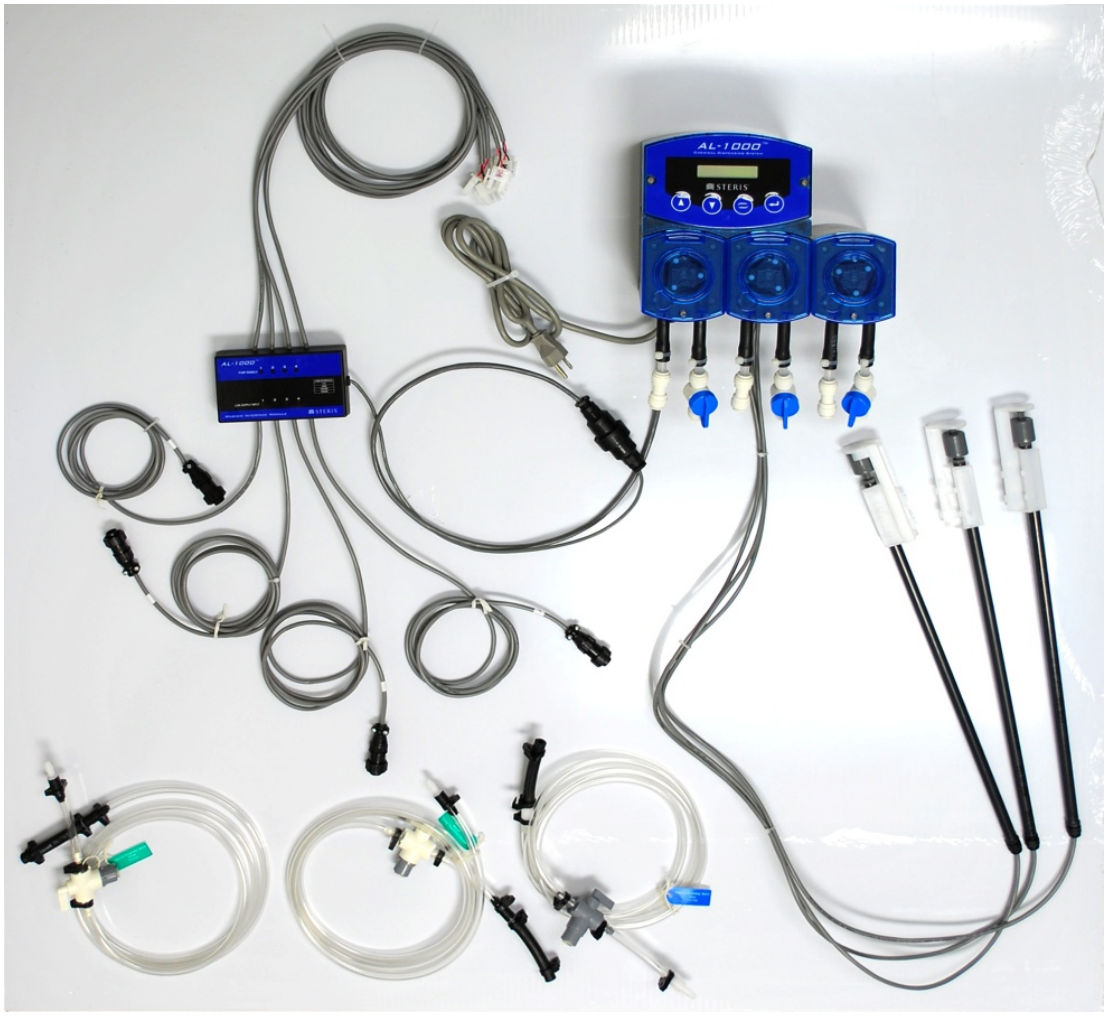
Precise speed controlled peristaltic metering pumps provide optimal accuracy for dosing of ultra concentrated chemistries for any wash pre-programmed wash cycle. A simple calibration procedure requires calibration to 30 ML or 120 ML per minute flow rates that enable precise washer control over dosing quantities.

Since the AL-1000 dosing system is mounted remote from the washer the system includes a low supply alarm function where with audible alarm at the system and communicated the same alarm to the washer user interface via the washer interface module.

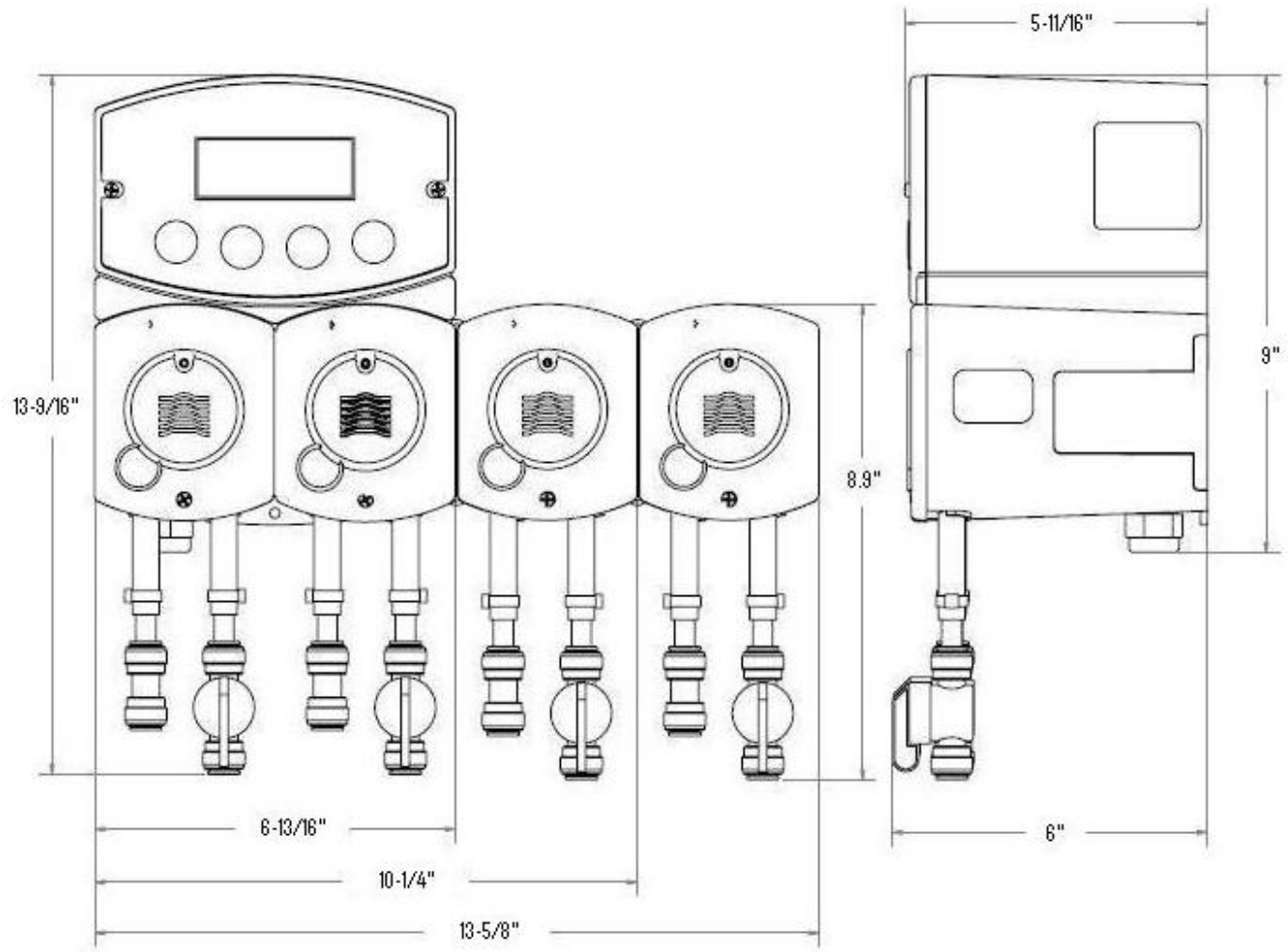
Bright pump signal LED's illuminate whenever a pump signal from the washer is present. If the LED is not lit the pump will not operate and visa-versa. Low supply sensor LED's also indicate when the float switch on the low supply sensor senses low level in the container.

Pumps can dose in the default "relay" mode for newer STERIS equipment or "signal" mode for all other washers.

Three pump configuration with main control, washer interface module, low supply sensors and injector kits.



AL-1000 Dimensions



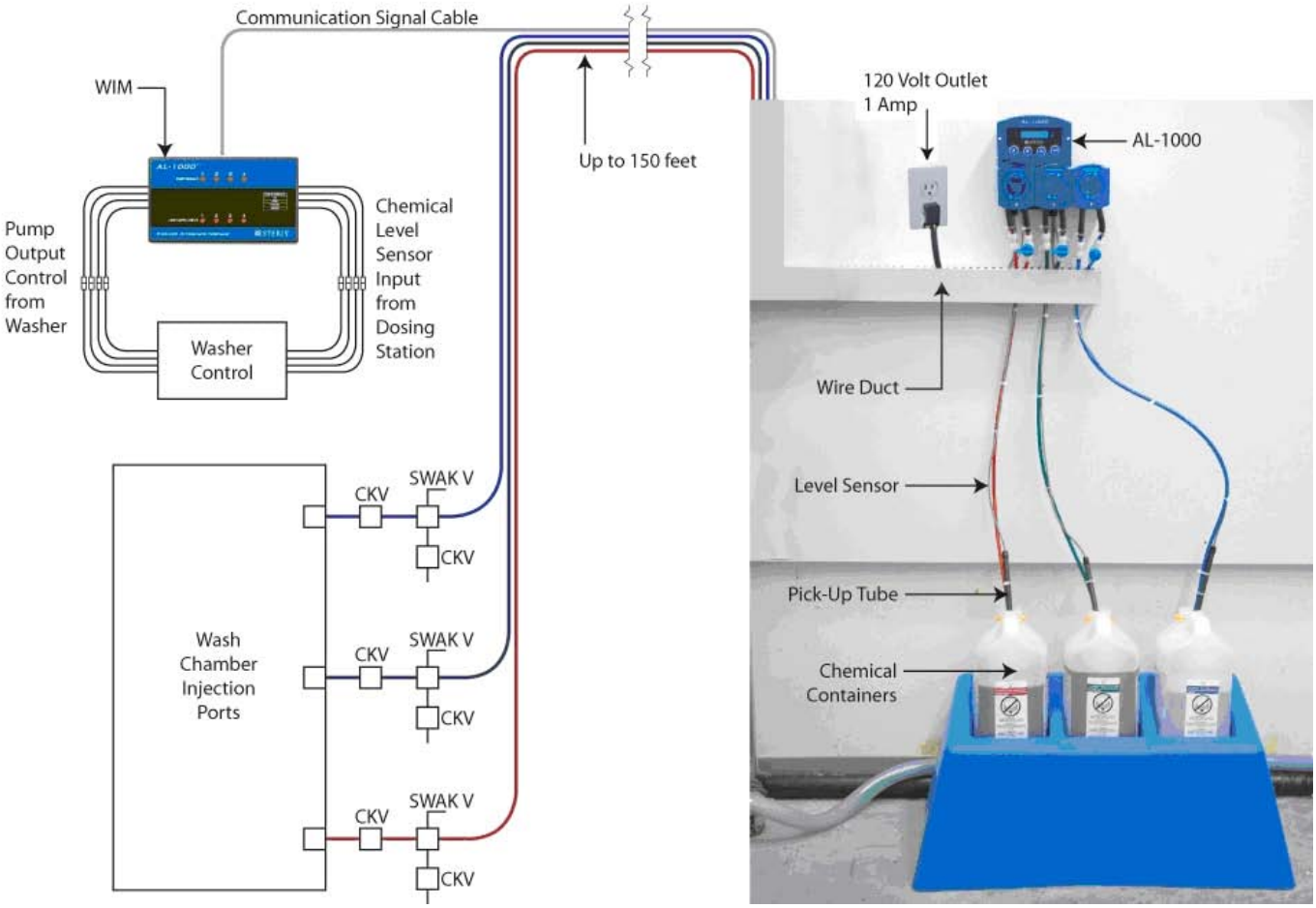
PRE-INSTALLATION

(1) Check all applicable plumbing and electrical codes before installation. This will help to ensure that the system is installed in a safe and suitable manner.
(2) Get a wiring schematic of the washer (provided by the machine mfr or may be on the machine itself).
(3) Check to make sure that all functions of the washer are operating properly.
(4) Check the proposed location for a 115 VAC receptacle for AL-1000.

Before beginning the installation, make sure you have the following tools and materials ready...

- Flat and Phillips screwdrivers. One screwdriver needs to have a long (20 cm) shank to reach the bottom mounting screw on the dispenser.
- Drill and drill bits. Use a 3/16" Masonry or standard bit depending on wall surface.
- Suitable 115 VAC electrical outlet with 2 Amp per pump dispenser (.5 amp per pump)
- Wire cutters, wire and cable strippers, and channel locks.
    - Tubing cutter
- Wire terminal connectors and a crimping tool.
- Voltmeter (or multi-meter).
- Dry wall anchors and mounting screws.
    - Colored 3/8" Poly tubing
    - AL-1000 communication cable (no substitutes)
    - Prolystica chemical container holder
    - Plastic 3" wire ducting

TYPICAL INSTALLATION

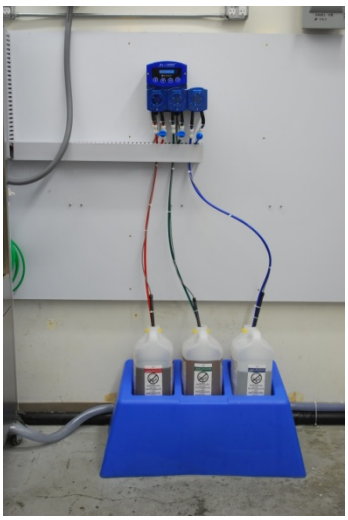


INSTALLATION — GENERAL
See Equipment Drawing/Template

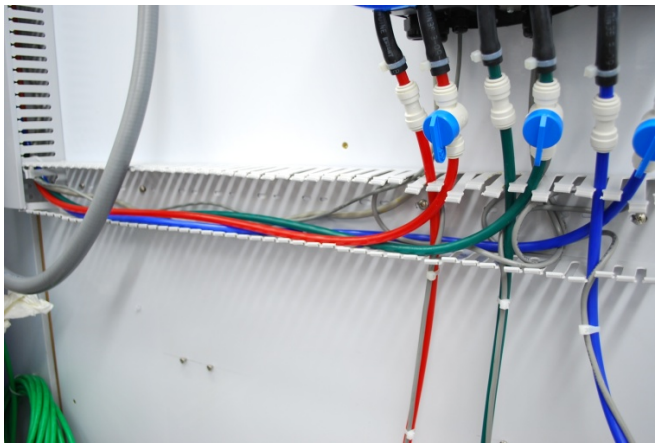
1. **Dosing system to be within six feet of power outlet. MUST have 115 VAC 2 AMP CAPACITY, GROUNDED.**

2. Dosing System should be mounted no more than five feet off the floor.

3. Dosing System to be mounted above Prolystica containers.

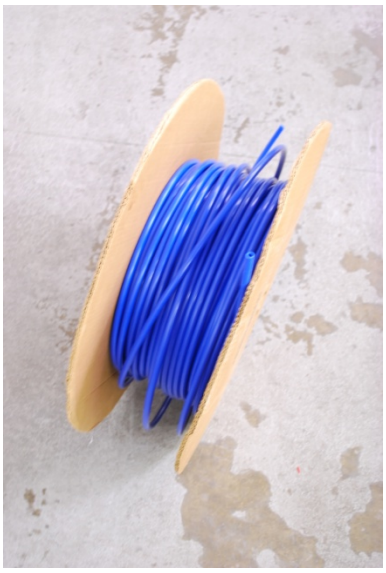


4. Wire Ducting to be used to channel all tubing, power cord and communication cable.



5. Low Level Sensors to be tie wrapped to chemical suction tubing.

6. Two Dosing Systems per set of Prolystica chemical containers.
7. Cable and tubing between washer and dosing system supplied separate. Customize lengths as required on site.



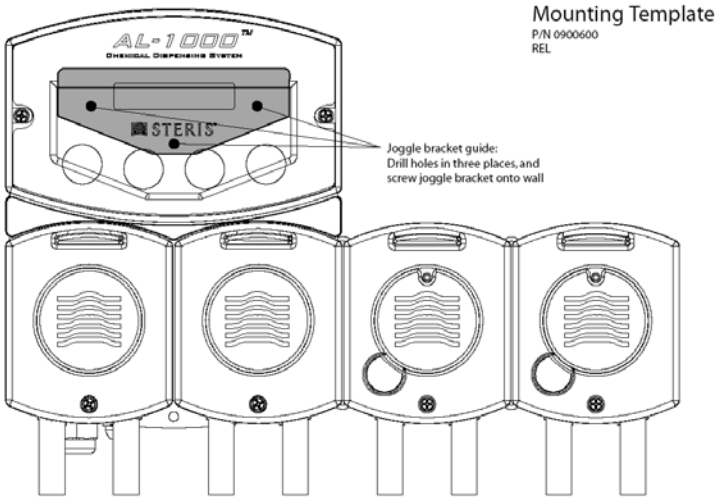
Mounting Instructions

1. Prior to installing dosing system verify chemical tubing from washer and communication cable routes are free of obstructions and less than 150 ft between washer and dosing system. *Verify local facility compliance for routing of chemical lines and cable in concealed ceiling spaces.*

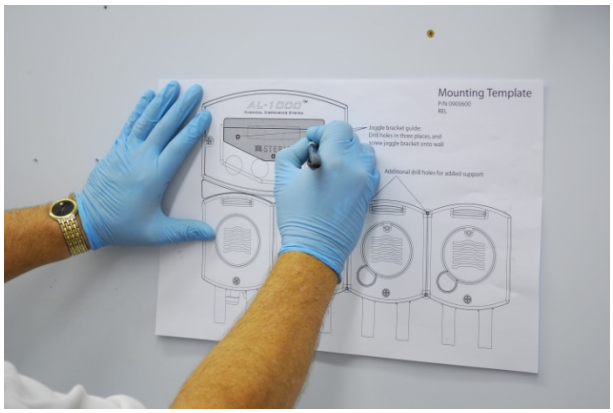
2. Measure appropriate lengths of communication cable and chemical tubing to reach from each dosing system to each washer allowing an extra eight feet from the top of the washer and two feet at the dosing systems.

3. Locate 115 VAC power outlet and mount dosing system with six feet (unless power strip used).

4. Use supplied paper mounting template to position system on the wall.



5. Mark mounting holes for mounting bracket locations.



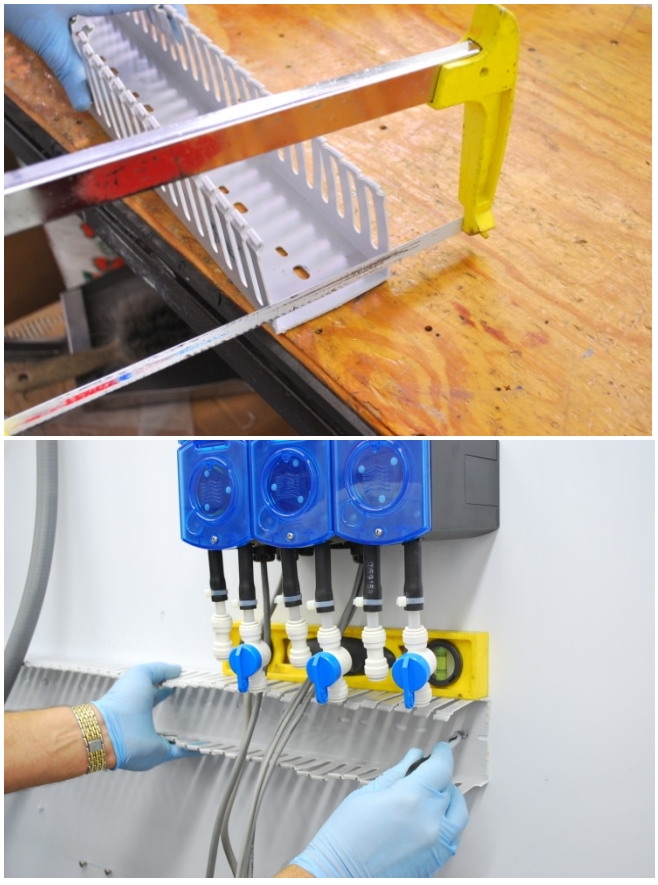
6. Level Sensors from dosing system must reach bottom of chemical containers from where system is installed.

7. For drywall or porous wall surfaces use #10 x 1” wall anchors and screws supplied with the system. For stainless steel or other hard surfaces use appropriate mounting screws.
8. Use a 3/16” masonry bit for concrete/block walls or standard drill bit for drywall surfaces.
9. Insert wall anchors making sure they are secure enough to hold the weight of the system.
10. Drill holes accordingly.

11. Remove mounting bracket from accessory kit and mount to wall. Align dosing system to bracket and drop into position. Press down firmly to fully “nest” the unit in place.

12. Install bottom mounting screws to prevent unit from coming off the wall.

13. Position/Install plastic wire ducting furnished cut to the proper length for one or more dosing systems. Wire ducting should be mounted underneath unit approximately 6” from the bottom of the unit using approximately 12” per dispenser. Cut lengths of plastic wire ducting using a hack saw and install bottom portion under dispenser using level.

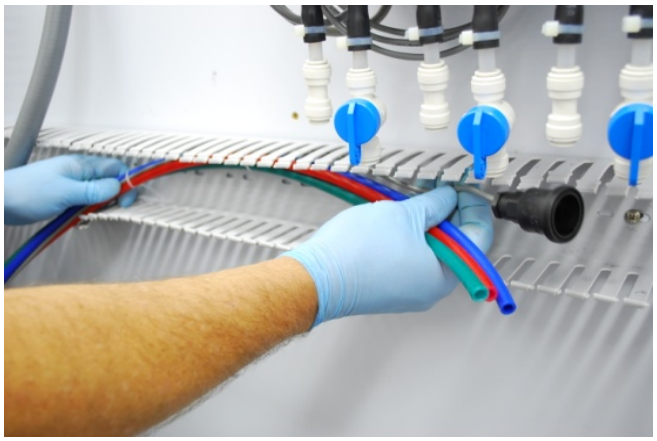


14. Disassemble communication cable connector housing to expose terminals and cable connections. Unplug internal connectors from each other.

15. Take communication cable coming from washer and remove insulation and strip four wire leads back 1”.

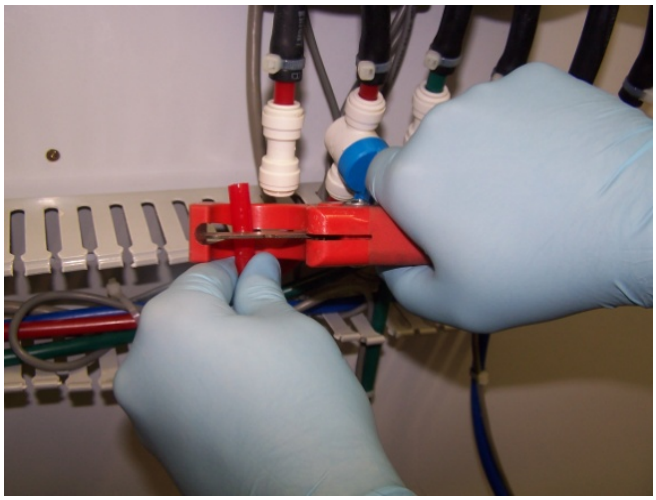
16. Connect four wire leads to spare cable connector/housing from service kit. Match wire colors accordingly (red/red, black&shield/black&shield, green/green, white/white) and connect to mating dosing system connector.

17. Tubing and communication cable runs should be conveyed in wire ducting and routed above dosing systems up to ceiling (and into ceiling where required). All cable and tubing near the work area should be neatly and safely tucked away in the wire ducting.



18. Position the Prolystica chemical container holder below the dosing system. Be sure the level sensors can reach the bottom of the chemical containers.

19. Cut 3/8” O.D. chemical tubing for the suction (left) side of each pump to the appropriate length to the reach bottom of chemical container.



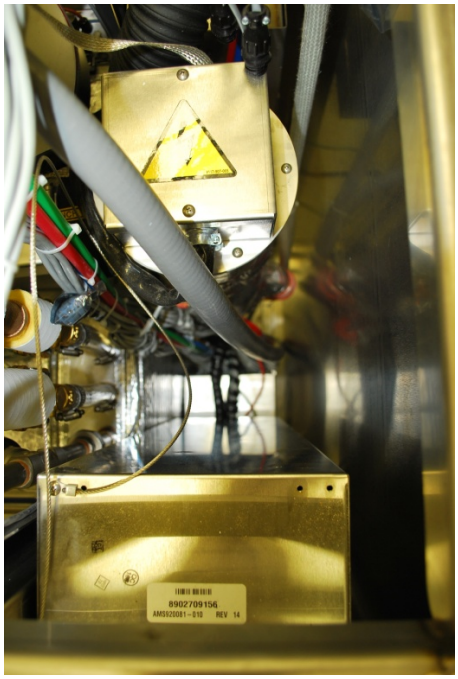
20. Insert tubing into “quick connect” fittings pushing inward until tubing “stops”. Make sure tube ends are cut square and no jagged ends that could result in leaks. Tubing color codes are:
    Red = Enzyme (Pump 1) Green = Neutral detergent (Pump 2) Blue = Lubricant (Pump 3)
    Violet = Alkaline Detergent (Pump 2 or Pump 4 if Pump 2 used by another detergent)
    Drying Agent = Natural (Pump 2 Cart Washer).

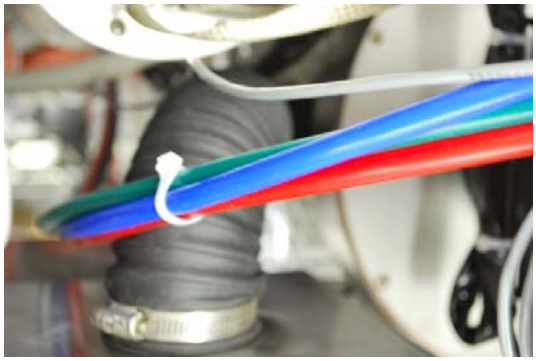
21. Insert discharge side 3/8” O.D. tubing into “quick connect” fittings pushing inward until tubing “stops”. Make sure tube ends are cut square and no jagged ends that could result in leaks. Be sure ball valve on this side is turned to the vertical position to allow flow to the washer.

22. Attach level sensor/tubing brackets to level sensors as shown.

23. Remove existing chemical tubing (inlet/outlet) and level sensor cables from the washer and external chemical containers. It is not necessary to remove existing pumps from the washers.

24. Drop chemical tubing and communication cable down from the top of the washer avoiding contact with steam and hot water lines that would cause leaks or electrical shorts. Tie off tubing and cable carefully with cable ties.

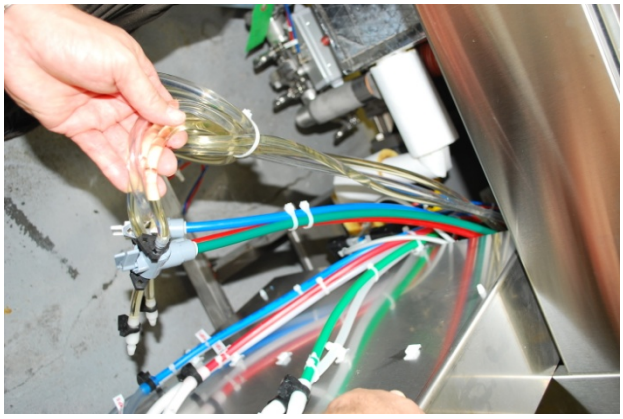




25. Route chemical tubing and locate near the existing chemical pumps. Note: It is permissible to customize alternate locations for systems with conveyors.

26. Connect the Injector Kit three way valve inlet quick connect to each of the colored chemical lines coming from the dosing system. Be certain to use the Viton (Blue label) kit for the Lubricant.

27. Position three way valves and calibration outlet in a convenient location in the washer for service.

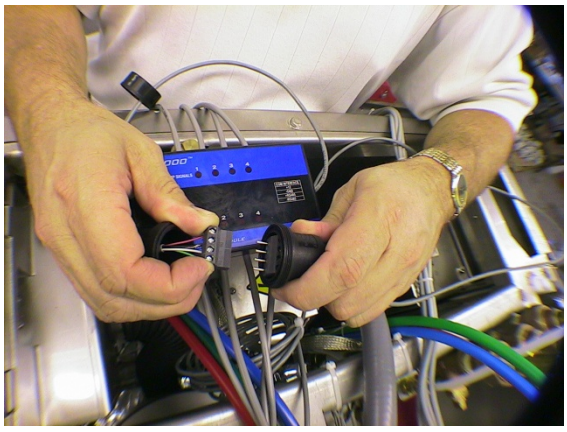


28. Connect clear vinyl tubing end from three way valve to the washer injection ports. Secure with plastic clamp. Note: Replace existing injector fittings if deteriorated or broken as required.

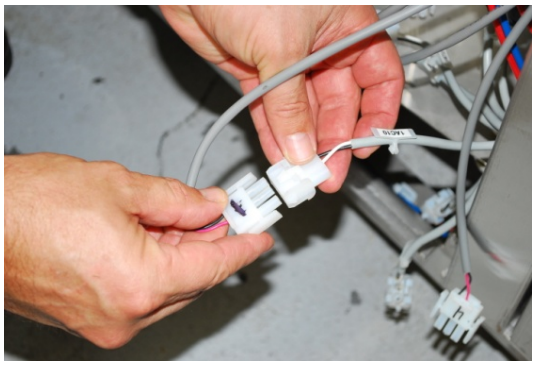
29. Position the Washer Interface Module in the washer in a convenient location for service.

30. Take communication cable coming from dosing system and remove insulation and strip four wire leads.

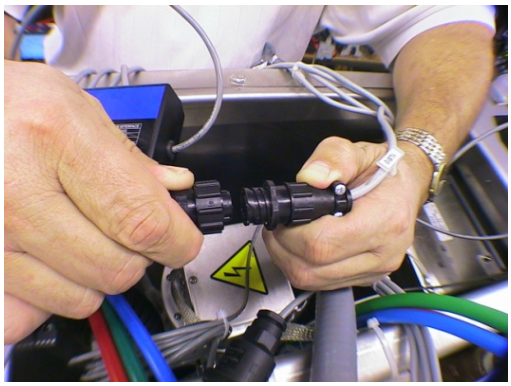
31. Connect four wire leads to spare cable connector/housing from service kit. Match wire colors accordingly (red/red, black/black etc.) and connect to mating Washer Interface Module connector.



32. Disconnect internal washer pump control output cables from existing pumps and connect corresponding pump signal connectors from Washer Interface Module. Tag washer connectors with chemical names (Corresponding Dosing System Pumps: Pump 1 = Enzyme, Pump 2 = Detergent, Pump 3 = Lubricant, Pump 4 = Alternate Detergent).



33. Disconnect internal washer Low Level Sensor control input cables from washer and connect corresponding Level Sensor cable from Washer Interface Module (1 = Enzyme, 2 = Detergent, 3 = Lubricant, 4 = Alternate Detergent)



34. Plug in dosing system(s) to 115 VAC power.

System Programming and Calibration

The AL-1000 has a menu driven programmable display that requires a pass code to enter the menu tree and program system parameters. The Enter key is the primary navigation key that allows forward progress through the programming menu tree, accepts programmed values and allows you to “lock” the system when done programming. At any time you can hold the enter key down for three seconds and the system will exit and return to the AL-1000 “run” display. If you forget to hold down the enter key when done or pause during programming the system will time out in 5 minutes and exit for you.

The run screen has a blue color while the programming screen color will be in violet. The screen color turns to green when the unit is pumping chemicals and flashes red when in a low supply state. Note: The display background and foreground color scheme shown in pictures are typical, alternate displays with inverted color scheme are also used by manufacturer.

An internal piezo alarm notifies operators that one of the chemical containers is low and will continue to do so until the low supply sensor is satisfied with a fresh container of chemistry. The display shows which of the chemical containers is empty.

1. Select the scroll key to choose the pump to be primed. Press the Up key to start/stop the pump.

2. Hold the Enter key until this screen appears. Passcode from the factory is “0000”. Press enter again and you now have access to the programming menu’s. Note: if you loose or misplace your passcode contact STERIS Technical Support for a temporary passcode.

3. Press the scroll key to choose the display language required. Press enter when finished.

4. Press Enter key until LOW LEVEL STATE displayed. Press the Scroll key to change LOW LEVEL SENSOR output from Washer Interface Module from Normally Open or Normally Closed switch. Most older Reliance washers use NO switch input, newer Reliance washers such as Vision use NC input. Press enter to move forward.
   IMPORTANT NOTE: Power must be cycled to initiate change from NO or NC state.

5. Press scroll and the down arrow key to reset factory defaults. This not needed on initial installation.

6. Press the scroll key to choose which pump/chemical is dispensed in each cycle. This will allow you to count each wash cycle. Pump #2 for detergent is the most common product to be dispensed in each cycle. Select Pump # 2 press enter.

7. Press the down arrow key to reset cycle counts to “0000”. Press enter to move forward.

8. Use the scroll key to select Metric volume units. For Prolystica Ultra Concentrates dosing is programmed in Milliliters not ounces to achieve accurate injections. Standard (U.S. Ounces) can be used for dilute traditional chemistries. Press enter to move forward.

9. The default operating mode for the AL-1000 is “**Relay**” mode. This operating mode allows the washer chemical outputs to control when the AL-1000 starts and stops dosing of chemistries. This mode should be used on most newer STERIS washers. “**Signal** mode should be used on older STERIS-AMSCO washers, older HAMO washers, and non-STERIS washers.

10. For STERIS washers using small 300 mL/minute pump, select the 30 ml/min flow rate to start your calibration procedure. Select the 120 ml/min flow rate for large 1200 mL/minute pump. Press Scroll key to select the pump number, press the Up arrow to select the appropriate flow rate. When all pumps have the correct flow rate press enter.

11. Press Scroll key to select which pump to calibrate or press enter key to skip past calibration routines.

12. Press the Up key to start the pump speed calibration routine. Press Scroll to select the pump to be calibrated then press the Up key to start the flow rate test. The pump will delay five seconds before starting. Make sure to have your graduated cylinder under the discharge tube before you start the pump. The pump will run for 60 seconds. Capture the fluid volume dispensed and note total milliliters dispensed.

13. In the next menu you will increase or decrease motor speed to achieve 30 or 120 ml/minute flow rate. If the fluid volume dispensed is less than the desired 30 or 120 ml/min increase the "New Speed" setting in increments of 5% then press enter to continue. Decrease the motor speed by the same % if the flow rate test results in too much chemical dispensed. Once you enter the New Motor Speed the controller will show the pump speed %. Press enter to continue calibrating the next pump and repeat steps 10, 11 and 12.

14. If you are running in Signal Mode (for Non-STERIS or HAMO Washers) follow all of the same procedures for calibration.

15. Signal Qualifying time is a signal filtering function that can be used to ignore “ghost signals” line noise and other voltage related false signals that could cause pumps to run when not needed. Set a higher Signal Qualifier (factory setting is 3 seconds) to a maximum 9 seconds if the washer chemical signal causes false triggering of your pumps.

16. In Signal Mode you will program your chemical volumes on this screen. Remember the AL-1000 in Signal Mode will control the dose volumes (ml’s or ounces).Enter your volume to be dispensed when the chemical signal from the washer is received. You can also program a “Delay” time that delays the injection for up to 99 seconds to allow water levels to rise etc.

17. Self test mode of operation is activated by pressing UP & DOWN arrow keys simultaneously. The control will sequence turning pumps ON/OFF and turning level sensor output to Washer Interface Module ON/OFF. COM ERRORS displayed should stay at 000; if it counts up this indicates a faulty communication cable or connection. Press and hold Enter key to resume normal operation.

FAQ's

Questions	Answers
What controls the dispenser dosing amount?	In Relay Mode it's the washer. In Signal Mode it's the AL-1000
What voltage will the system run on?	The preferred voltage is 110 VAC, but it will run on 208 VAC or 230/240 VAC. See manual for system changes
What is the distance these pumps will dose?	Up to 150 feet
How long should suction lines be?	Suction lines should not be longer than 15 feet
Can I use the old STERIS pump tubes in the pump?	No, the old tubes are the wrong dimension and material and will not function properly
When should I change the tubes out?	12 Months for enzymatic cleaner, detergents, drying agents and 6 months for lubricant
If I forget my access code, how do I get a new one?	Call STERIS Technical Support.
Why should I need to know program version? How can I determine program version in AL-1000?	As technology improves new program features may be added. It is helpful to provide program version when calling technical support. The program version is displayed momentarily on power up.
How often should I lubricate the tubes?	At least once each 90 days.
How do I know when to replace the check valves?	When chemical won't discharge or when check valves leaks **AFTER** pump is off.
Can I use any check valve?	No. Use only the parts that are made for the system. Be sure to use the EPDM check valve for everything except the lubricant. Use Viton for lube.
How long after I get the chemical signal should the pump start?	In Relay Mode it will start right away. In Signal Mode the signal qualifying time setting from the factory is set to 3 seconds.
Who do I contact for signal wiring procedures on a non STERIS washer?	First you need to acquire the wiring schematic for the washer. Identify the chemical pump outputs that run the existing internal pumps or locate the terminal outputs that provide a chemical signal of 18VAC to 240VAC when the selected pumps need to run. Identify the common (neutral leg) and the HOT for each chemical signal input you will wire to the Washer Interface Module (WIM). Check with a volt meter prior to wiring to the WIM. If you still have difficulty getting your pumps to start. Contact Knight for assistance.

Troubleshooting

Problem	Resolution
Pumps won't Prime	Check for blockage in the suction line Check for a bad check valve on the discharge Check for a bad ball valve on the discharge side of the pump Check for blockage in discharge line Check for air leaks on suction side Check to see if check valve is in backwards Check to see if suction line is broken or cracked Is the squeeze tube worn out? Make sure the #3 pump selector switch is on position # 3 Check if the pump roller is worn or defective Is the pump motor wire loose or off the terminal? Check for a defective microcontroller or Input/Output board
Pumps won't start on signal	Signal length too short (Signal Mode) Bad connection at Washer Interface Module pump inputs Check signal qualify time setting (Signal Mode) No flow rate programmed No chemical valve programmed Loose pump motor wire Defective Washer Interface Module No input signal from washer (WIM LED's not on)
Pumps not dosing right amount for chemical	Incorrect flow rate, recalibrate pump Worn squeeze tube Worn check valve Blockage in discharge or suction lines Programmed dose not correct Motor Speed setting incorrect Air or chemical leak
Pump Motor Running too Slow	Plugged check valve Worn out squeeze tube Worn out roller block Incorrect squeeze tube Incorrect power input to system Defective transformer Worn out gear motor Lubricate pump
Display characters missing or "garbled"	Microcontroller failure Wiring loose Loose wire harness to Microcontroller Moisture damage
Face plates cracked or broken	Screw over tightened Wrong tube lubricant used

Illustrated Parts Breakdown

GENERAL

Assemblies and components of the STERIS AL-1000 Chemistry Delivery System are illustrated and identified on the following pages. The part number, the description and the quantity required for each usage are given (see Page 32).

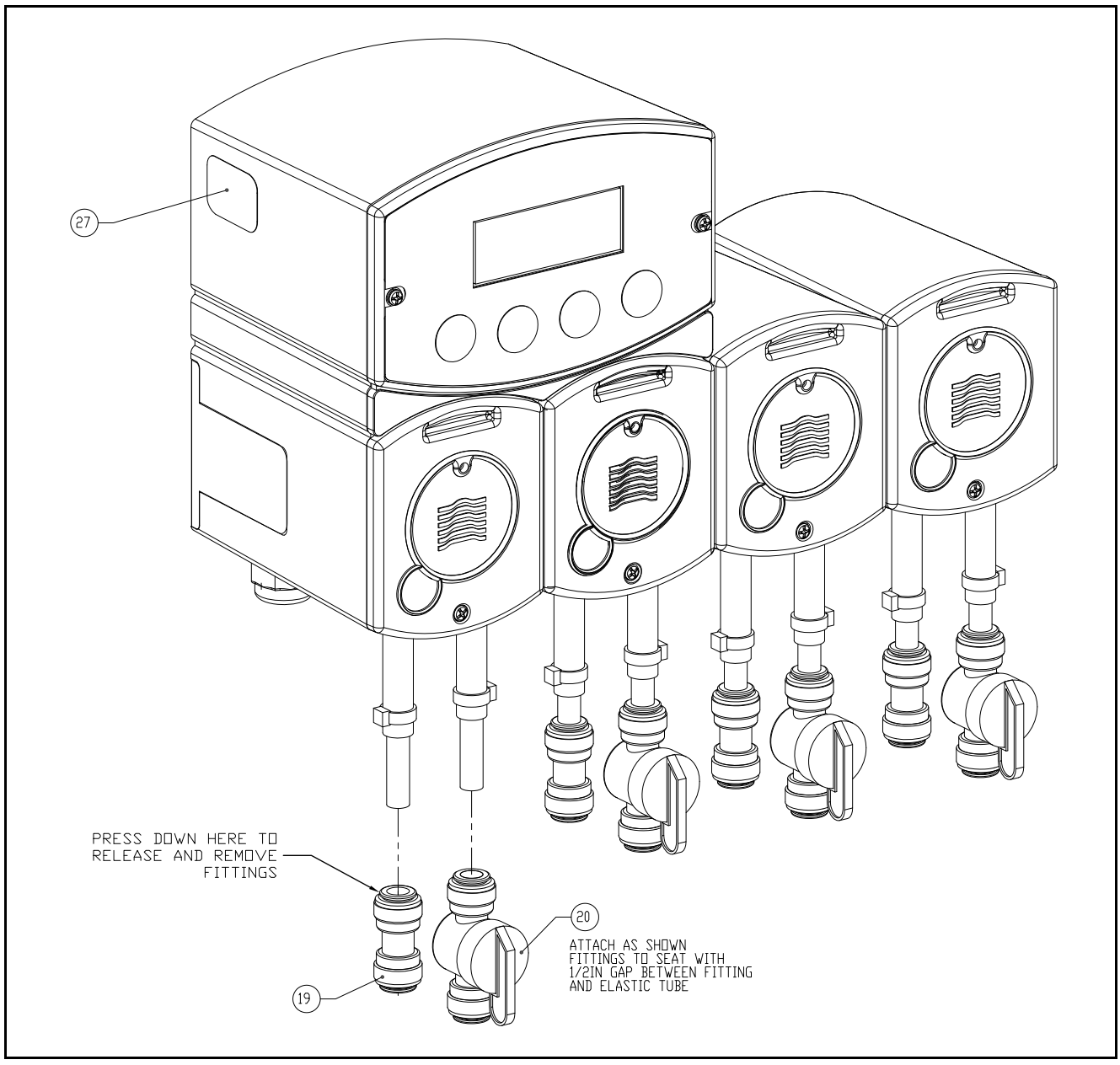


Figure 1

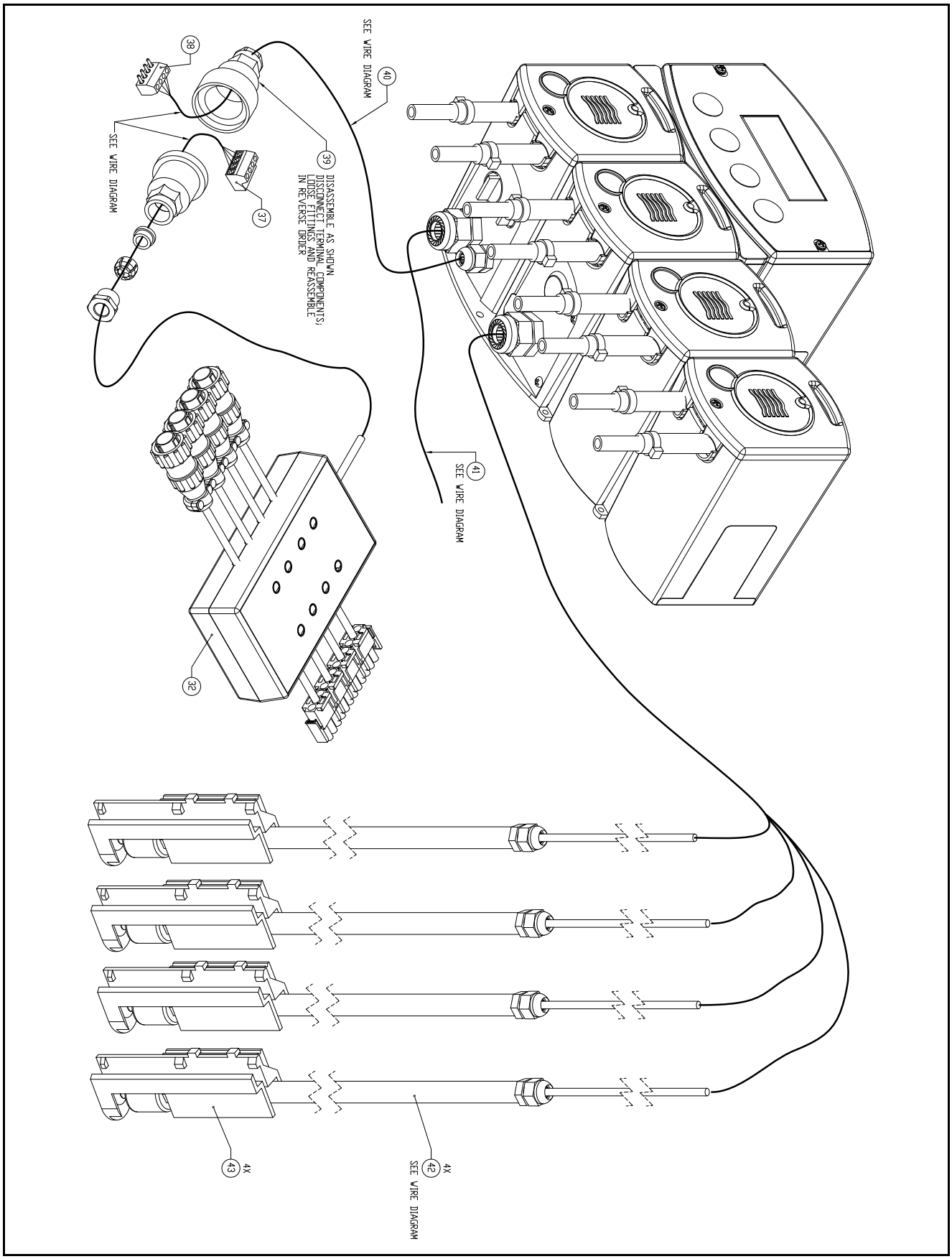

38
SEE WIRE DIAGRAM
37
39
DISASSEMBLE AS SHOWN
DISCONNECT TERMINAL COMPONENTS,
LOOSE FITTINGS, AND REASSEMBLE
IN REVERSE ORDER
40
SEE WIRE DIAGRAM
41
SEE WIRE DIAGRAM
32
43
4X
42
4X
SEE WIRE DIAGRAM

Figure 2

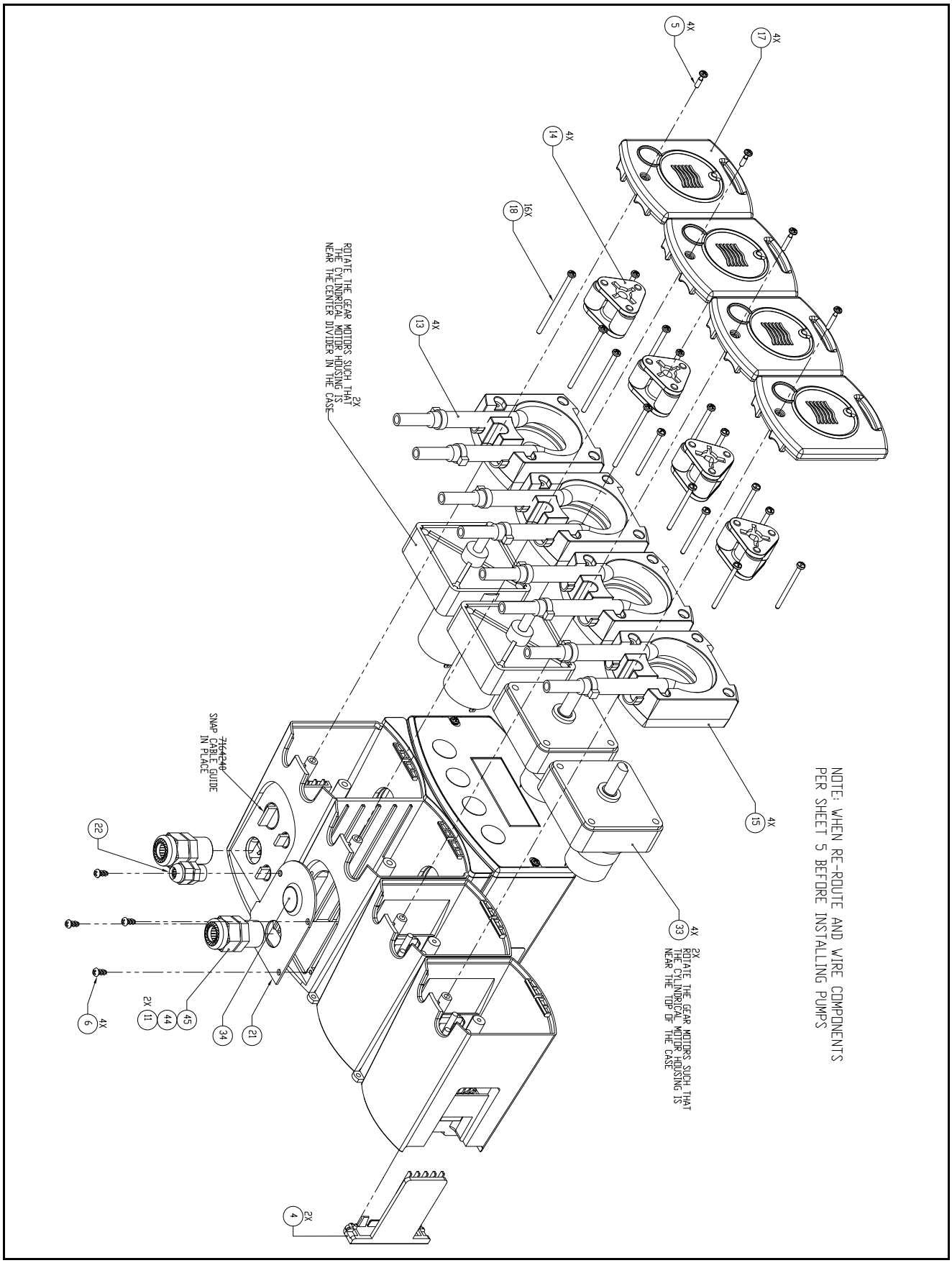

NOTE: WHEN RE-ROUTE AND WIRE COMPONENTS PER SHEET 5 BEFORE INSTALLING PUMPS
ROTATE THE GEAR MOTORS SUCH THAT THE CYLINDRICAL MOTOR HOUSING IS NEAR THE CENTER DIVIDER IN THE CASE
2X
ROTATE THE GEAR MOTORS SUCH THAT THE CYLINDRICAL MOTOR HOUSING IS NEAR THE TOP OF THE CASE
4X
SNAP CABLE GUIDE IN PLACE
764434
5
4X
17
4X
14
4X
18
16X
13
4X
15
4X
33
4X
22
6
4X
11
2X
44
45
34
21
4
2X

Figure 3

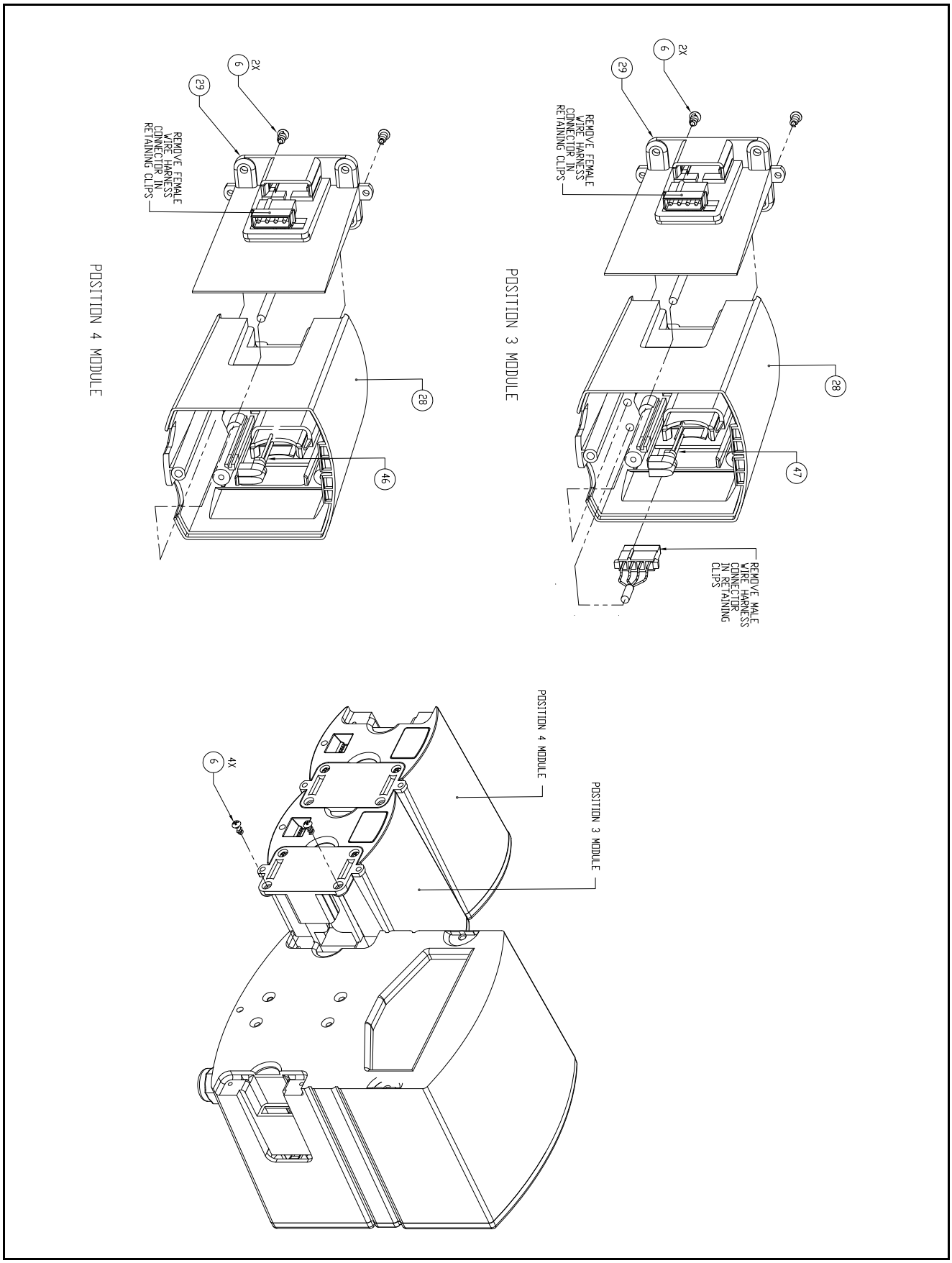

POSITION 4 MODULE
2X
6
29
REMOVE FEMALE WIRE HARNESS CONNECTOR IN RETAINING CLIPS
28
46
POSITION 3 MODULE
2X
6
29
REMOVE FEMALE WIRE HARNESS CONNECTOR IN RETAINING CLIPS
28
47
REMOVE MALE WIRE HARNESS CONNECTOR IN RETAINING CLIPS
POSITION 4 MODULE
POSITION 3 MODULE
4X
6

Figure 4

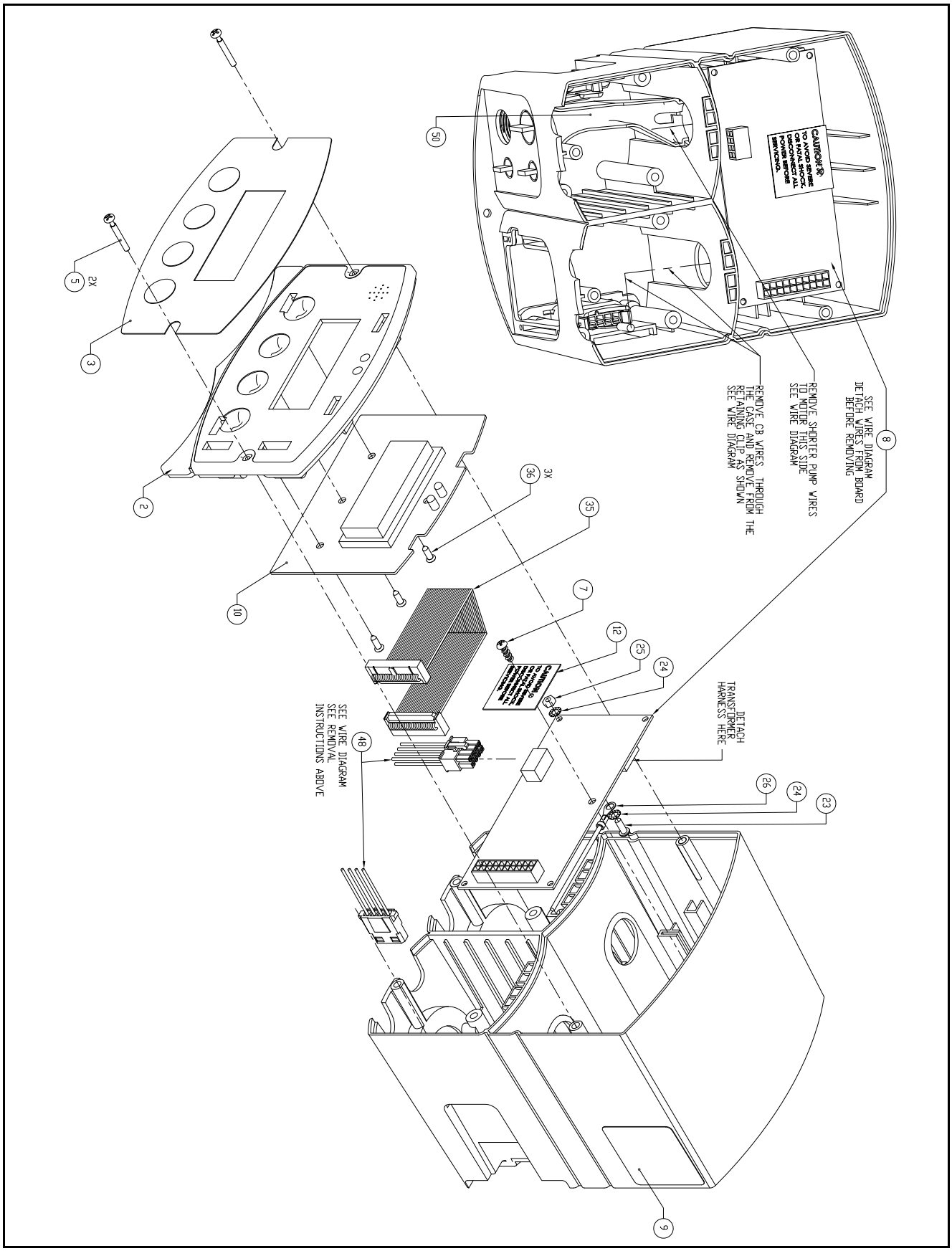

50
2X
5
3
2
3X
36
35
10
7
12
25
24
48
26
24
23
8
9
REMOVE CB WIRES THROUGH THE CASE AND REMOVE FROM THE RETAINING CLIP AS SHOWN SEE WIRE DIAGRAM
REMOVE SHORTER PUMP WIRES TIED TO MOTOR THAT'S SIDE SEE WIRE DIAGRAM
SEE WIRE DIAGRAM DETACH WIRES FROM BOARD BEFORE REMOVING
SEE WIRE DIAGRAM SEE REMOVAL INSTRUCTIONS ABOVE
DETACH TRANSFORMER HARNESS HERE
CAUTION!
TO AVOID SEVERE OR FATAL SHOCK DISCONNECT ALL POWER BEFORE SERVICING.

Figure 5

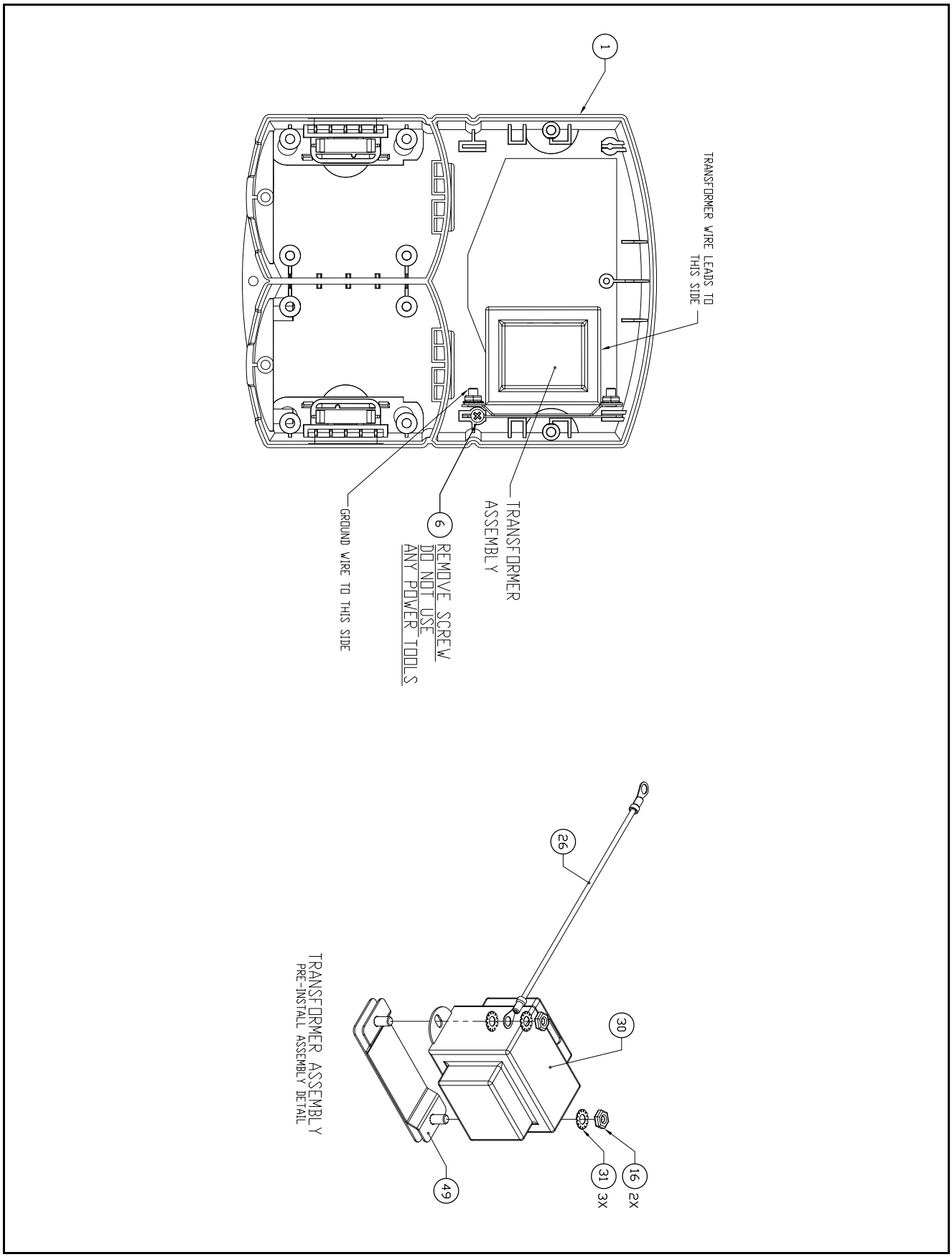

1
TRANSFORMER WIRE LEADS TO THIS SIDE
GROUND WIRE TO THIS SIDE
6
REMOVE SCREW DO NOT USE ANY POWER TOOLS
TRANSFORMER ASSEMBLY
TRANSFORMER ASSEMBLY
PRE-INSTALL ASSEMBLY DETAIL
26
30
49
31
3X
16
2X

Figure 6

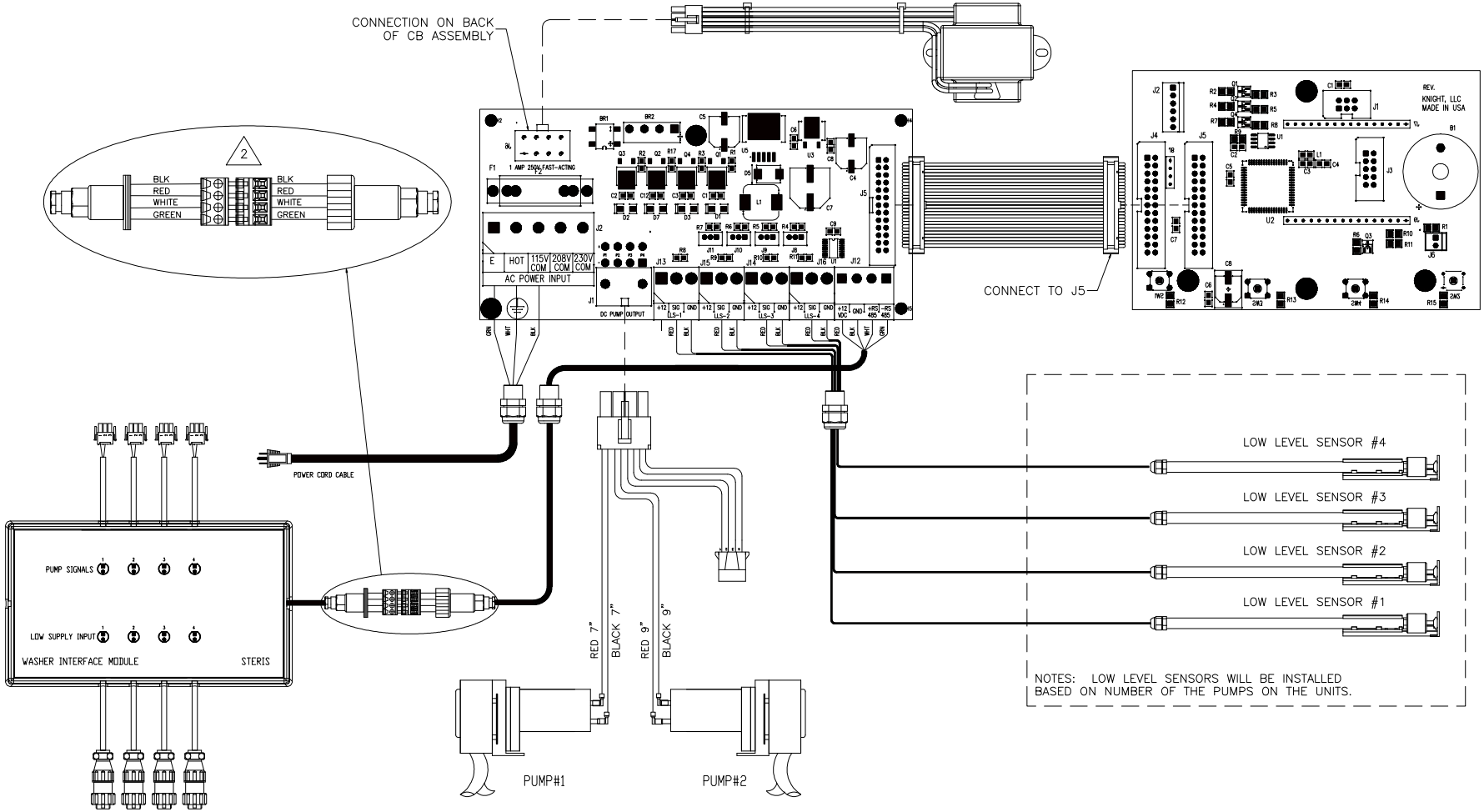
Table 1

Item Number	Description	Part Number	Quantity
1	CASE, Base	71642000KN	1
2	COVER, Base	71642010KN	1
3	LABEL, Al-1000 Main Cover	12006270KN	1
4	PLATE, Case Blanking	71642100KN	2
5	SCREW, Self Retaining	19004560KN	2
6	SCREW, HI-LOW, Zinc Plate	19008740KN	13
7	SCREW, HI-LOW, 410 Stainless Steel	19008730KN	1
8	CIRCUIT BOARD ASSEMBLY, Input/Output	71407270KN	1
9	LABEL, Caution, Universal	12001310KN	1
10	CIRCUIT BOARD ASSEMBLY	71405690KN	1
11	BODY, Strain Relief	19004000KN	2
12	LABEL, Caution	12001850KN	1
13	ASSEMBLY, Squeeze Tube	70181200KN	4
14	ASSEMBLY, Three-Lobe Roller	75034500KN	4
15	BODY, Pump	71642090KN	4
16	NUT, 8-32 x 32, Hex, Stainless Steel	14004380KN	2
17	PLATE, Face, STERIS AL-1000	71642840KN	4
18	SCREW	19004550KN	16
19	CONNECT, Push	06006030KN	4
20	VALVE, Speedfit, Shut-Off	03009110KN	4
21	BRACKET, Control Guard	71642680KN	1
22	RELIEF, Strain, 1/2" Diameter	19004100KN	1
23	SCREW, Stainless Steel	19006040KN	1
24	LOCKWASHER	23007900KN	2
25	NUT, 6-32, Hex, Stainless Steel	14004350KN	1
26	WIRE SET, 20 Gauge, 8"	23011050KN	1
27	LABEL, Serial, Generic	NA	1
28	CASE, Satellite	71642120KN	2
29	INTERFACE, Case/Satellite	71642130KN	2
30	ASSEMBLY, Transformer With Plug	71642790KN	1
31	LOCKWASHER, Tooth, Stainless Steel	23007840KN	3

Table 1 (Cont'd)

Item Number	Description	Part Number	Quantity
32	MODULE, WIM	76551490KN	1
33	GEARMOTOR, With Cap, 100 RPM	70102410KN	4
34	PLUG, Black Hole	08004490KN	1
35	CABLE, Ribbon, 26 Pins	03003520KN	1
36	SCREW, Pan Head, Zinc	19006240KN	3
37	BARRIER, Four-Post Socket	02003530KN	1
38	BARRIER, Four-Post	02003540KN	1
39	HOUSING, Cable Connector	02003550KN	1
40	HARNESS, WIM Wire	23002790KN	1
41	CORD, Power (6' With Plug)	03000860KN	1
42	ASSEMBLY, Switch	71101920KN	4
43	BRACKET, Pick-Up Tube	70010220KN	4
44	WASHER, Strain Relief	19004010KN	1
45	NUT, Strain Relief Lock	19004020KN	1
46	HARNESS, Wire (With Connector)	23002770KN	1
47	HARNESS, Wire (With Connector)	23002760KN	1
48	HARNESS, Wire (With Connector)	23002750KN	1
49	BRACKET, Transformer	73172520KN	1
50	GUIDE, Cable (Left Side)	71642400KN	1

Schematic


CONNECTION ON BACK OF CB ASSEMBLY
CONNECT TO J5
BLK
RED
WHITE
GREEN
AC POWER INPUT
DC PUMP OUTPUT
POWER CORD CABLE
PUMP SIGNALS
LOW SUPPLY INPUT
WASHER INTERFACE MODULE
STERIS
RED 7"
BLACK 7"
RED 9"
BLACK 9"
PUMP#1
PUMP#2
LOW LEVEL SENSOR #4
LOW LEVEL SENSOR #3
LOW LEVEL SENSOR #2
LOW LEVEL SENSOR #1
NOTES: LOW LEVEL SENSORS WILL BE INSTALLED BASED ON NUMBER OF THE PUMPS ON THE UNITS.
KNIGHT, LLC
MADE IN USA